

## **Probabilistic Outlooks V. Deterministic Forecasts:**

### **Probabilistic Outlooks**

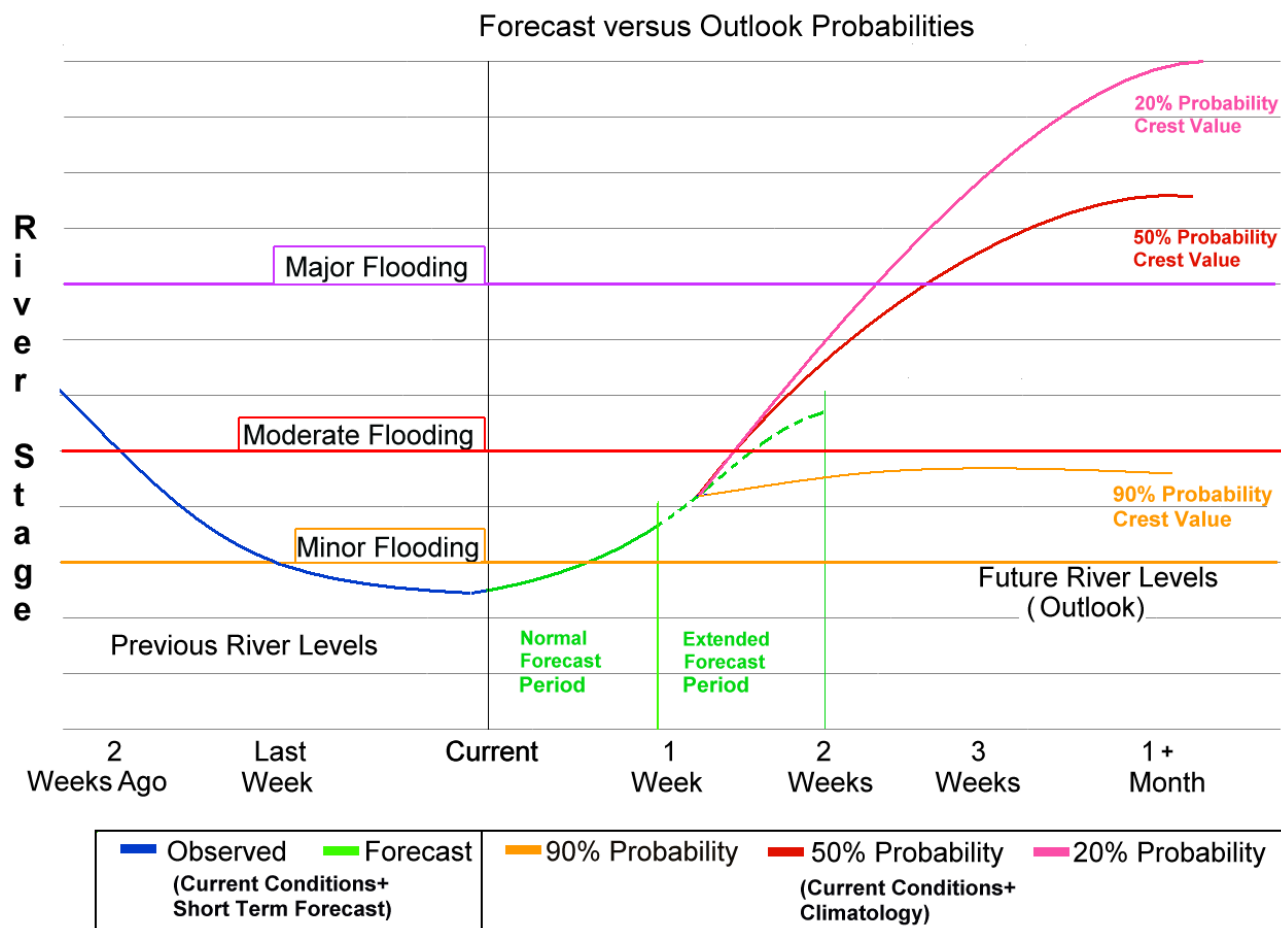
- Long-Range Probabilistic Outlooks (ESF) were updated on Friday, April 3<sup>rd</sup>, 2009...using current conditions as of April 2<sup>nd</sup> and valid for the period from April 9<sup>th</sup> to July 8<sup>th</sup>. Most of the crests are forecast to occur during April.
- ESFs are produced by ranking the crests from an ensemble of model hydrographs using 58 years of historical climate data (i.e., temperatures and precipitation from 1948 through 2006).
- ESFs give a range of river crests ranked by the Probability of Exceeding a given river level during the period of the Outlook. (POEs are given for the 98% to 2% range).
- ESFs are based on current hydrometeorological conditions and past climatology.

### **“Deterministic” Forecasts**

- Deterministic Forecasts for the main-stem Red River were issued on April 8<sup>th</sup>, 2009 and provide a range for crests through day 14.
- Deterministic Forecasts are issued usually for a 7-day period.
- Deterministic Forecasts are produced using current river conditions and **ONLY** a 24-hour precipitation forecast.
- The April 8<sup>th</sup> issuance included temperature forecasts for the full 14-day period, but with **ONLY** a 24-hour precipitation forecast. Weather forecast models indicate a relatively dry period through day 10. There is an indication by one model for an open gulf low influencing the Red River Valley (RRV) near the end of the 14-day river forecast.
- Crest ranges provide a 2 foot range to account for long-range model uncertainties.
- Forecasts will change as the flooding progresses. They will become more precise and accurate as the actual crest nears.

### **Factors Affecting the Second Crest**

- Ground across the southern basin is still saturated and frozen due to wet fall conditions.
- Additional snowfall since last month's snowmelt has re-insulated the ground and has not allowed the top soil to thaw in many places.
- The existing snowpack will run directly into the rivers as it melts rather than soaking into the frozen, wet soils.
- After soils thaw, they will still be saturated.
- Areas of overland flooding and backwater south of Fargo and North of Grand Forks still have to drain into the river system.
- Snowpack and river ice still exist in the headwaters of the Sheyenne river. Snowpack has yet to melt on the valley upland areas in the mid and lower RRV, as does river ice on the main-stem near and north of Drayton and many smaller tributaries in the mid and lower RRV.. However, the threat of ice jam flooding has lessened in the southern basin and on the main-stem Red south of Drayton.
- Days with above freezing temperatures and nights below freezing at the start of the current snow melt are favorable for lower crests.
- A relatively dry period for the upcoming week is also favorable for lower crests.
- Widespread, significant rain beyond the 14-day forecast period would add to or extend river levels, especially in the southern RRN basin.
- A quick thaw during the snow melt would also add to higher river levels. This is less likely at this time.



Graphic representation of how the short term, deterministic forecast relate to the longer range probabilistic outlooks. In this example, the river is forecast to start rising back above the minor level in a few days. Based on near term weather forecasts, the rise is expected to reach moderate flood levels during week 2. Assuming normal precipitation during the next month, the river would rise to major flood levels near the start of week 3 (Red line, marked 50% probability curve) If above normal precipitation occurs, perhaps with a more rapid melt, the river would rise faster, and go higher (Purple line, marked 20% probability curve). If little precipitation falls and the melt is extended longer than normal, the river may rise less (Golden line, marked 90% probability curve)

Chance of exceeding stages at Mainstem Red River locations  
VALID 4/9/2009 - 7/8/2009

LOCATION	FS (FT)	90%	80%	70%	60%	50%	40%	30%	20%	10%
WAHPETON ND	10	17.3	18.0	18.4	18.5	18.6	18.7	19.0	19.4	19.9
FARGO ND	18	40.4	40.8	41.2	41.4	41.7	41.9	42.4	43.3	44.6
HALSTAD ND	26	39.2	39.4	39.7	39.9	40.0	40.2	40.7	41.2	42.3
GRAND FORKS	28	49.8	50.3	50.7	51.2	51.7	52.1	52.7	53.8	56.1
OSLO MN	26	37.8	38.0	38.1	38.4	38.6	38.7	38.9	39.4	40.3
DRAYTON ND	32	43.6	43.9	44.1	44.5	44.7	44.9	45.2	46.1	46.6
PEMBINA ND	42	53.8	53.8	54.0	54.1	54.2	54.4	54.5	54.7	54.9